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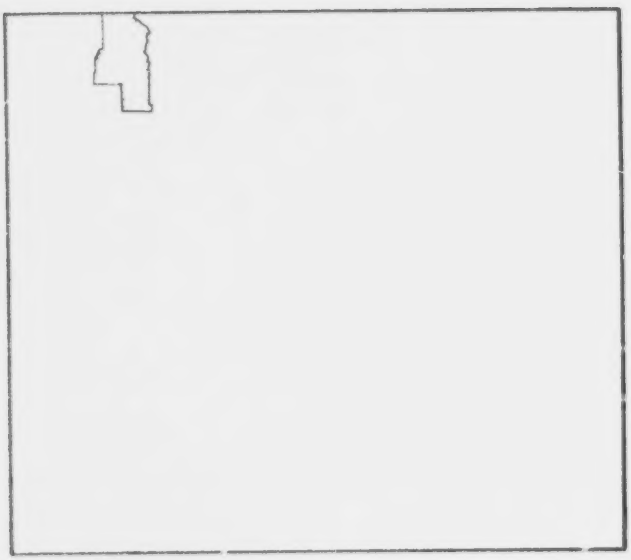
FLOOD INSURANCE STUDY

ROUTT COUNTY, COLORADO
UNINCORPORATED AREAS



SEPTEMBER 29, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 080156

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
ROUTT COUNTY, COLORADO (UNINCORPORATED AREAS)

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the unincorporated areas of Routt County, Colorado, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Department of the Interior, Geological Survey (USGS), for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. IAA-EMW-85-E-1823, Project Order No. 24. This study was completed in May 1987.

1.3 Coordination

An initial community coordination meeting was held in February 1985 to determine the streams to be studied by detailed methods. The meeting was attended by representatives of the study contractor, FEMA, and the community.

On August 23, 1988, the results of this study were reviewed and accepted at a final coordination meeting attended by representatives of the study contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the unincorporated areas of Routt County, Colorado. The area of study is shown on the Vicinity Map (Figure 1).

The following streams were studied by detailed methods throughout the county:

- The Yampa River was studied from approximately 2.5 miles downstream from its confluence with Slate Creek to the corporate limits of Steamboat Springs. It was also studied upstream from the corporate limits of Steamboat Springs to a point approximately 7,500 feet upstream from State Highway 131.

- The Elk River was studied from approximately 3,300 feet upstream from its confluence with Yampa River to a point approximately 4,500 feet upstream of County Road 62.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through May 1992.

The incorporated communities of Steamboat Springs, Oak Creek, Hayden, and Yampa are not included in this study.

2.2 Community Description

Routt County is located in northwestern Colorado adjacent to the Wyoming border. It is bordered by Carbon County, Wyoming to the north; Jackson and Grand Counties to the east; Eagle County to the south; and Garfield, Rio Blanco, and Moffat Counties to the west. The county seat is the Town of Steamboat Springs, located in the eastern-central portion of the county. According to the 1980 U.S. Census, Routt County has a population of 13,404 and a land area of 2,367 square miles (Reference 1).

Routt County is divided into the Northern Plateau Region and the Mountain Region with the separation of the two regions at the 7,500-foot elevation. The Northern Plateau Region comprises the Yampa River basin below an elevation of 7,500 feet. The annual precipitation ranges from approximately 10 inches at areas below the 7,500-foot elevation, to about 20 inches at areas above 7,500 feet, of which approximately 60 percent occurs as snowfall from October through April. Summer thunderstorms produce high-intensity rainfall in the region, but are usually limited in areal extent. Floods are primarily caused by snowmelt runoff from April through June. The Mountain Region comprises approximately two-thirds of Routt County and consists of land at an elevation of 7,500 feet or higher. The principal form of precipitation in the Mountain Region during winter is snow derived from moisture moving eastward from

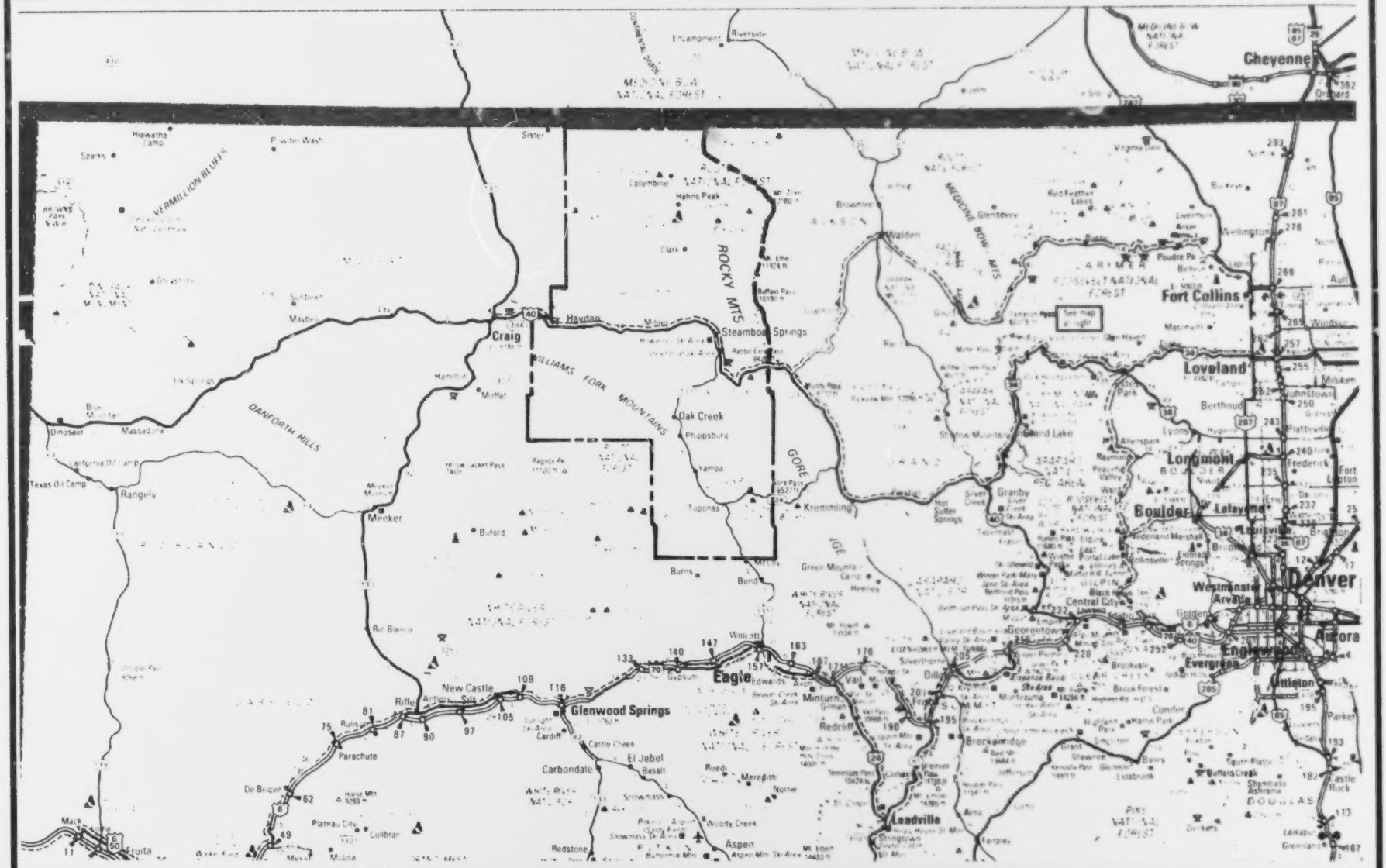


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO
(UNINCORPORATED AREAS)

APPROXIMATE SCALE

22 0 22 44 66 MILES

VICINITY MAP

the Pacific Ocean. The orographic effect of the high mountains generally produces more snowfall on the western slopes. Infrequently, severe floods are caused by rainfall during optimum conditions of snowpack depth and rate of temperature rise. During the summer, rainfall occurs throughout the region, but because of the elevation, the moisture supply is insufficient to produce significant floods (Reference 2).

The climate in Routt County is characterized by cool summers and severe winters. The monthly average temperature in January is 15.0°F and 61.9°F in July. The mean maximum temperature in January is 29.4°F and 83.0°F in July, and the mean minimum temperature in January is 0.6°F and 40.8°F in July (Reference 3).

2.3 Principal Flood Problems

The flood hazard in Routt County downstream of Steamboat Springs results from Yampa River overflows. The Yampa River flows from the southeast to Steamboat Springs and then westerly. Slate Creek enters the Yampa River in the study reach. The potential for flood damage along the Yampa River is not great because of the lack of development.

The flood hazard upstream of Steamboat Springs is also due to overflow from the Yampa River. This reach of the Yampa River flows northerly. Here, Oak Creek and other smaller tributaries enter the Yampa River. The potential for flood damage along this study reach is not great because of the lack of development.

The largest flood recorded in the 65 years of record at USGS gaging station No. 09239500 on the Yampa River at Steamboat Springs, located at the 5th Street bridge, occurred on June 14, 1921. The peak discharge was 6,820 cubic feet per second (cfs) resulting from snowmelt and rainfall. This flood has a recurrence interval of approximately 50 years, or has a chance of 2 in 100, on the average, of occurring in any given year.

Flooding problems in the vicinity of the communities of Clark and Glen Eden are due to overflow from the Elk River, which flows from the northeast along the northwestern boundaries of these two communities. There are several small tributaries entering the Elk River within the reach studied. The potential for flood damage along the Elk River is not great due to the lack of development. The Elk River will overflow Routt County Road 58 during a 100-year flood.

The largest flood recorded in the 68 years of record at USGS gaging station No. 09241000 on the Elk River at Clark, located at Routt County Road bridge 129, occurred on May 23, 1984. The peak discharge of 4,910 cfs resulted from snowmelt. This flood had a recurrence interval of greater than 100 years, or less than a 1 in 100 chance, on the average, of occurring in any given year. The 1984 flood resulted in minor overbank flooding causing minimal property damages, except for local stream erosion.

2.4 Flood Protection Measures

At the present time, there are no flood-protection measures within the study area other than small levees constructed by local entities. However, flow of the Yampa River is slightly affected by Catamount Lake, Lester Creek Reservoir (also known as Pearl Lake) and Steamboat Lake. These lakes do not provide flood protection.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1 and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community.

Peak discharge-drainage area relationships for the Yampa and Elk Rivers are shown in Table 1.

TABLE 1. SUMMARY OF DISCHARGES

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Yampa River					
At downstream end of the study reach	666	--[1]	--[1]	8,930	--[1]
Approximately 250 feet upstream of the Steamboat Springs corporate limits	520	--[1]	--[1]	5,000	--[1]

TABLE 1. SUMMARY OF DISCHARGES (cont'd)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Elk River					
At downstream end of the study reach	221	--[1]	--[1]	4,220	--[1]

[1]Data Not Available

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Insurance Rate Map (FIRM) (Exhibit 2).

A total of 81 cross sections were used in the backwater analyses for the Yampa River. Forty-seven cross sections were obtained from field surveys and 13 were synthesized. Eight cross sections, R through Y, were obtained from the U.S. Army Corps of Engineers (COE) Flood Hazard Information Study and 13 cross section were obtained from the Town of Steamboat Springs Flood Insurance Study (References 3 and 4). A total of of 39 cross sections were used in the backwater analyses for the Elk River. Twelve cross sections were obtained from field surveys and 27 were synthesized. The synthesized cross sections were estimated from adjacent surveyed cross sections and topographic maps. Three field-surveyed cross sections defined the structural geometry and elevations for one railroad bridge and one private road bridge along the downstream portion of the Yampa River. The structural geometry and elevations for the two bridges and road sections were also obtained from the field survey along the Elk River. The locations of the cross sections used in the backwater analysis are shown on the flood profiles and maps. The lengths between cross sections R to Y along the downstream portion of the Yampa River are unknown and are only shown to the limits of the flood boundary. Cross sections were located upstream and downstream from bridges in order to compute the backwater effects of the structures.

Parts of the Yampa River floodplain are relatively wide shallow-flow areas or are bisected by the Denver and Rio Grande Western Railroad embankment, U.S. Highway 40, or State Highway 131 culverts, and hence would be ineffective flow areas of relatively shallow ponding during the 100-year flood. The ineffective flow areas were not considered in the hydraulic analysis, but the flood boundaries do reflect the flooding in these areas. There are areas

at a few cross sections that, although surrounded by flow, will not be inundated by the 100-year flood. Those areas are only shown on the work map where they are large and continuous over several sections.

Channel roughness factors (Manning's "n") used in the hydraulic computations were determined by engineering judgment based on field observations of the floodplain areas and by using prediction equations developed by Jarrett (Reference 5). Along the Yampa River, values ranged from 0.043 to 0.060 for the channel and 0.031 to 0.080 for the overbank areas. Along the Elk River, values ranged from 0.045 to 0.062 for the channel and 0.040 to 0.090 for the overbank areas.

Water-surface elevations for the 100-year flood were computed by WSPRO, a step-backwater computer program developed by the USGS for the Federal Highway Administration (Reference 6). The starting water-surface elevation for the downstream portion of the Yampa River was determined using the slope-conveyance method (Reference 6). The starting water-surface elevation for the upstream portion of the Yampa River was determined using the 100-year flood elevation defined by the FEMA (Reference 3). The starting water-surface elevation for the Elk River was determined using the slope-conveyance method (Reference 6).

Flood profiles were drawn showing computed water-surface elevations to a plotted accuracy of 0.5 foot for the 100-year flood. The flood profile also shows the streambed elevation, location of bridges, cross sections and tributaries.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

One exception to this was made in determining the floodplain boundaries downstream from cross section D. It was assumed that the rock and earth levee shown on the map just upstream from the railway bridge on the right bank will wash out.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the maps; the description of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages state and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 100-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Floodplain boundaries were plotted at surveyed and synthesized cross sections and interpolated between cross sections based on the contours shown on the 7.5-minute topographic quadrangle maps of Steamboat Springs, Rocky Peak, Mud Creek, Cow Creek, Blacktail Mountain, and Clark, Colorado, at a scale of 1:24,000, with a contour interval of 40 feet (Reference 7). Flood boundaries for cross sections R to Y were transferred from maps supplied by the COE, because these maps are at smaller scales, and thus have more detail and definition (Reference 4).

The downstream boundary of upstream portion of the Yampa River (located at Cross Section AL) matches the upstream boundary of the Flood Hazard Information Study prepared by the COE in cooperation with FEMA (References 4 and 3).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE). Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

Approximate 100-year floodplain boundaries in some portions of the study area were taken directly from Flood Prone Quadrangle Maps (Reference 8).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum

standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated at selected cross sections (Table 2). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

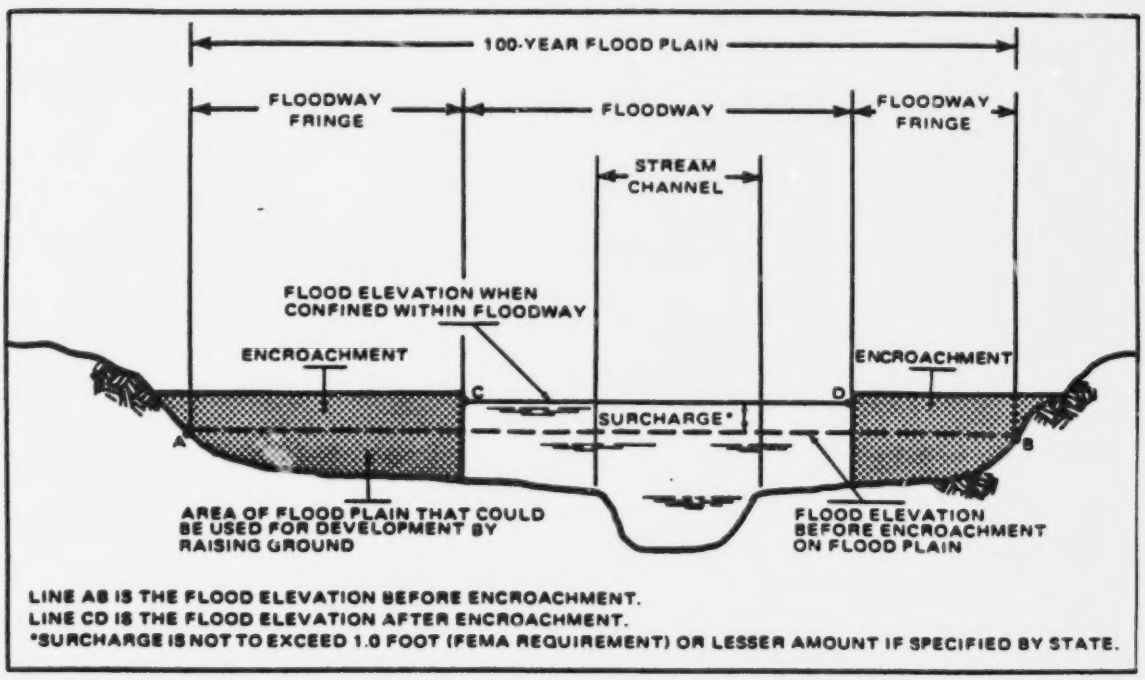

100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

Figure 2. Floodway Schematic

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE[3]
					(FEET NGVD)			
Yampa River								
Y	40,652	125/20	870	10.0	6,673.6	6,673.6	6,673.6	0.0
Z	41,075	135/20	1,000	8.7	6,677.2	6,677.2	6,677.3	0.1
AA	42,708	130/25	880	9.9	6,680.3	6,680.3	6,680.4	0.1
AB	42,500	115/45	910	9.6	6,685.2	6,685.2	6,685.2	0.0
AC	53,745	115/50	850	9.0	6,740.5	6,740.5	6,740.5	0.0
AD	54,643	110/70	1,040	6.5	6,743.2	6,743.2	6,743.2	0.0
AE	55,541	120/80	1,160	5.8	6,744.7	6,744.7	6,744.8	0.1
AF	55,911	120/50	1,000	6.7	6,745.4	6,745.4	6,745.5	0.1
AG	60,082	115/80	890	7.6	6,750.0	6,750.0	6,751.0	1.0
AH	60,980	120/105	1,370	3.6	6,751.3	6,751.3	6,751.8	0.5
AI	62,564	120/0	1,310	5.1	6,752.4	6,752.4	6,753.3	0.9
AJ	64,782	165/0	900	5.5	6,754.2	6,754.2	6,754.9	0.7
AK	66,049	90/0	420	12.0	6,756.2	6,756.2	6,756.3	0.1

[1]Feet Above Elk River
[2]Width/Width Within County Limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO
(UNINCORPORATED AREAS)

FLOODWAY DATA

YAMPA RIVER

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

A Flood Insurance Study has been published for the Town of Steamboat Springs (Reference 3). The results of this study are in exact agreement with the results of that study.

A Flood Hazard Information Report for Steamboat Springs, Colorado, was prepared by the COE, Sacramento District (Reference 4). The results of that study were incorporated into this study.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, Denver Federal Center, Building 710, Box 25267, Denver, Colorado 80225-0267.

9.0 BIBLIOGRAPHY AND REFERENCES

1. Colorado Water Conservation Board/U.S. Geological Survey, Technical Manual No. 1, Manual for Estimating Flood Characteristics of Natural-Flow Streams in Colorado, 1976.

2. U.S. Department of Commerce, Bureau of the Census, General Population Characteristics, Colorado, 1980.

3. U.S. Army Corps of Engineers, Sacramento District, Flood Hazard Information--Steamboat Springs, Colorado, 1976.

4. Federal Emergency Management Agency, Flood Insurance Study, Town of Steamboat Springs, Colorado, April 19, 1983.

5. Jarrett, R.D., Determination of Roughness Coefficients for Streams in Colorado, U.S. Geological Survey, Water-Resources Investigation, Report 85-4004,1985.

6. Federal Highway Administration, Bridge Waterways Analysis Model/Research Report, by H.N. Flippeo, W.N. Kirby, J.O. Sherman, and V.R. Schneider, 1986.

7. U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 40 feet: Steamboat Springs, Colorado (1969); Rocky Peak, Colorado (1962); Mud Creek, Colorado (1962); Cow Creek, Colorado (1969); Blacktail Mountain, Colorado (1969); Clark, Colorado (1962),

8. U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps (flood-prone), Scale 1:24,000, Contour Interval 40 feet; Oak Creek, Colorado (1969); Cow Creek, Colorado (1969); Blacktail Mountain, Colorado (1969),

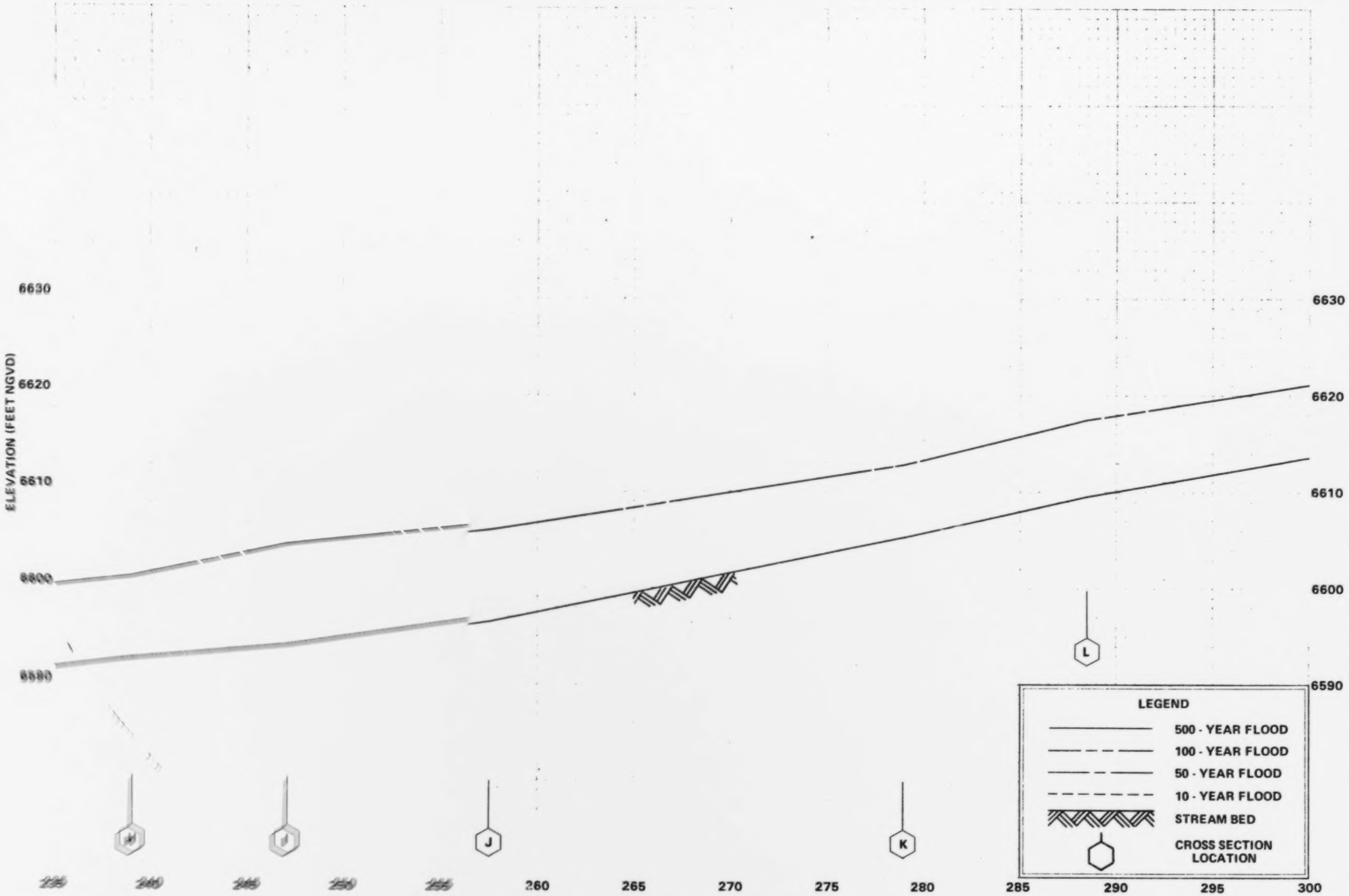
FLOOD PROFILES

YAMPA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

01P



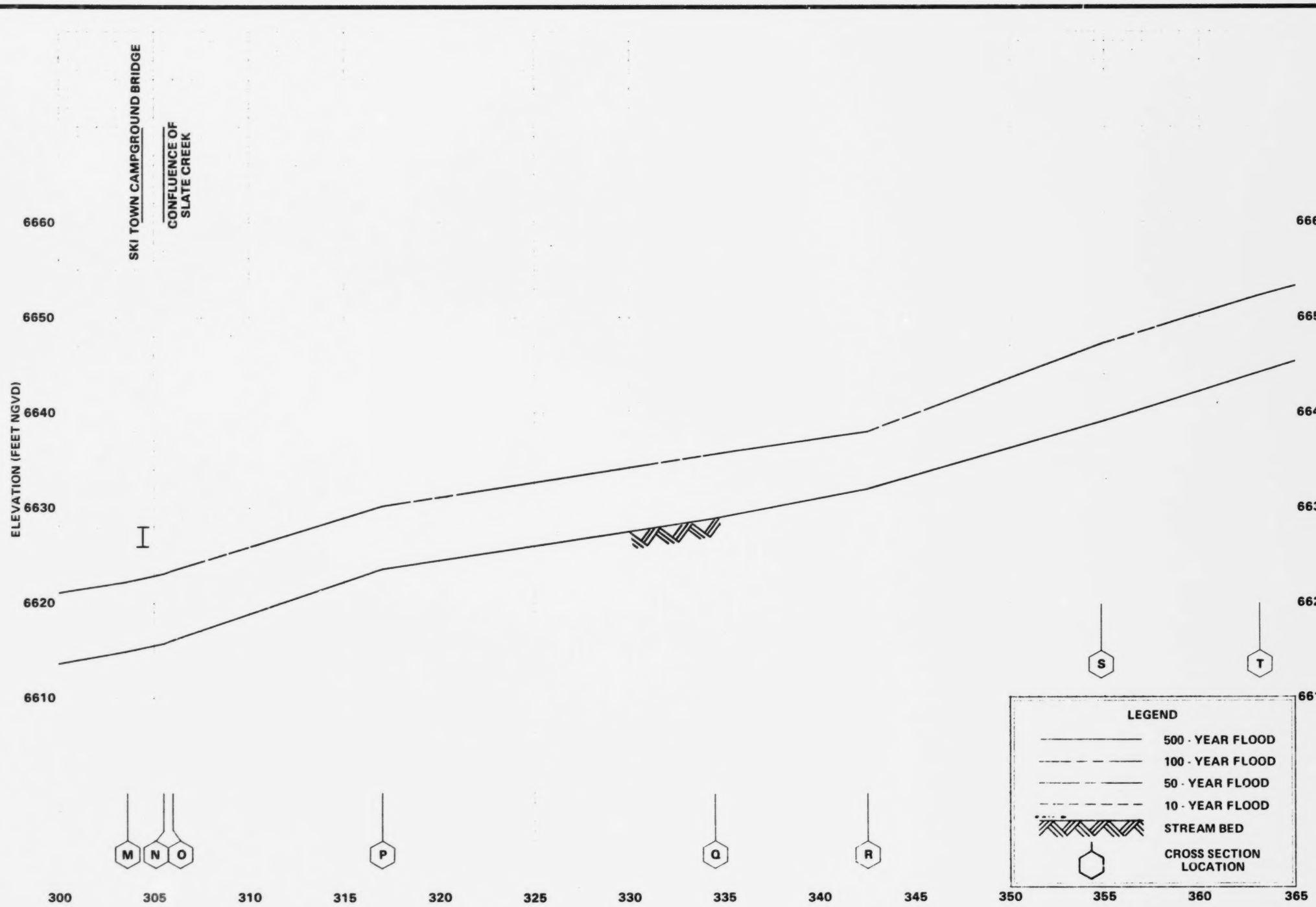
FLOOD PROFILES

YAMPA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

02P



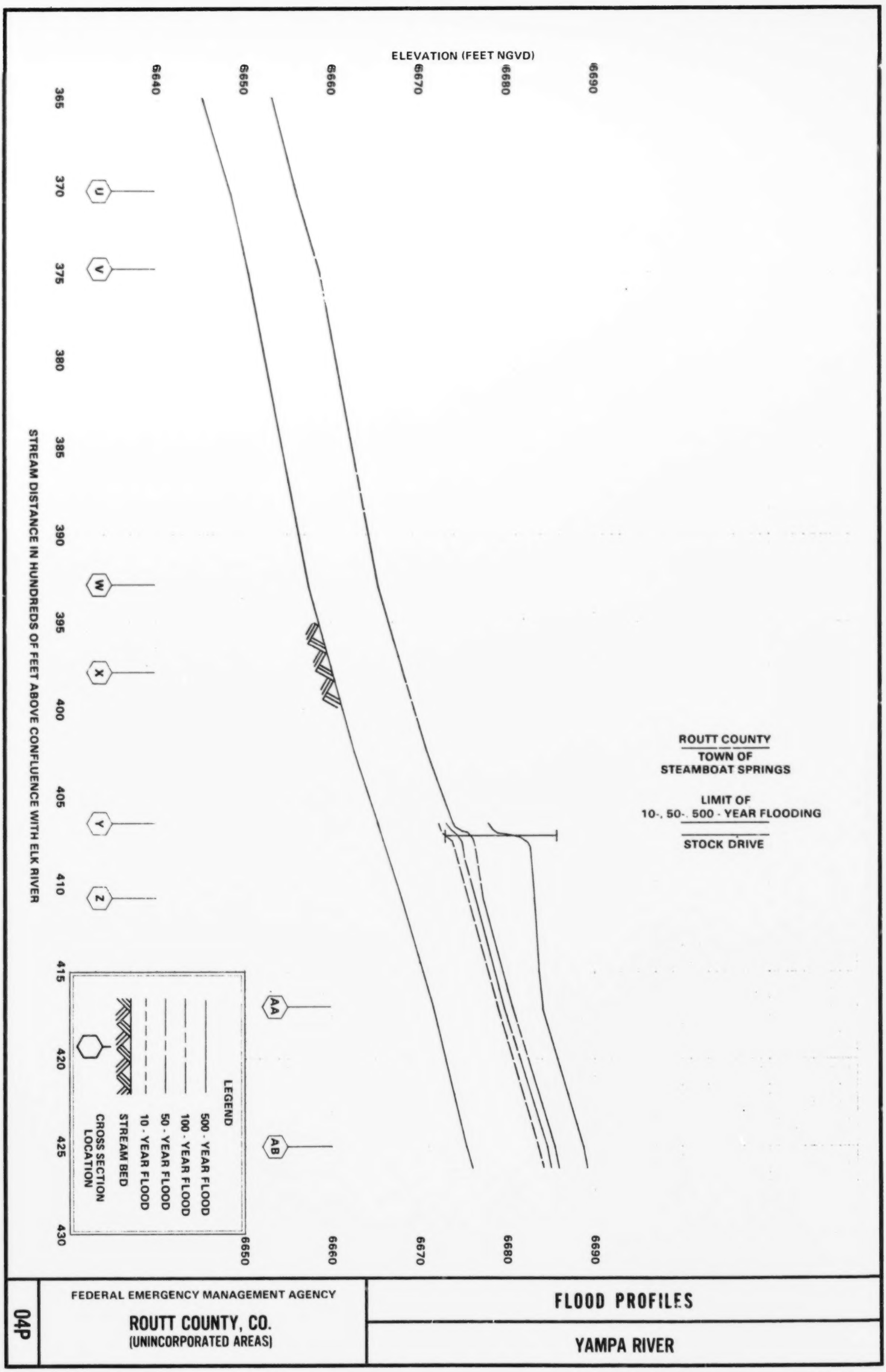
FLOOD PROFILES

YAMPA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

03P



16

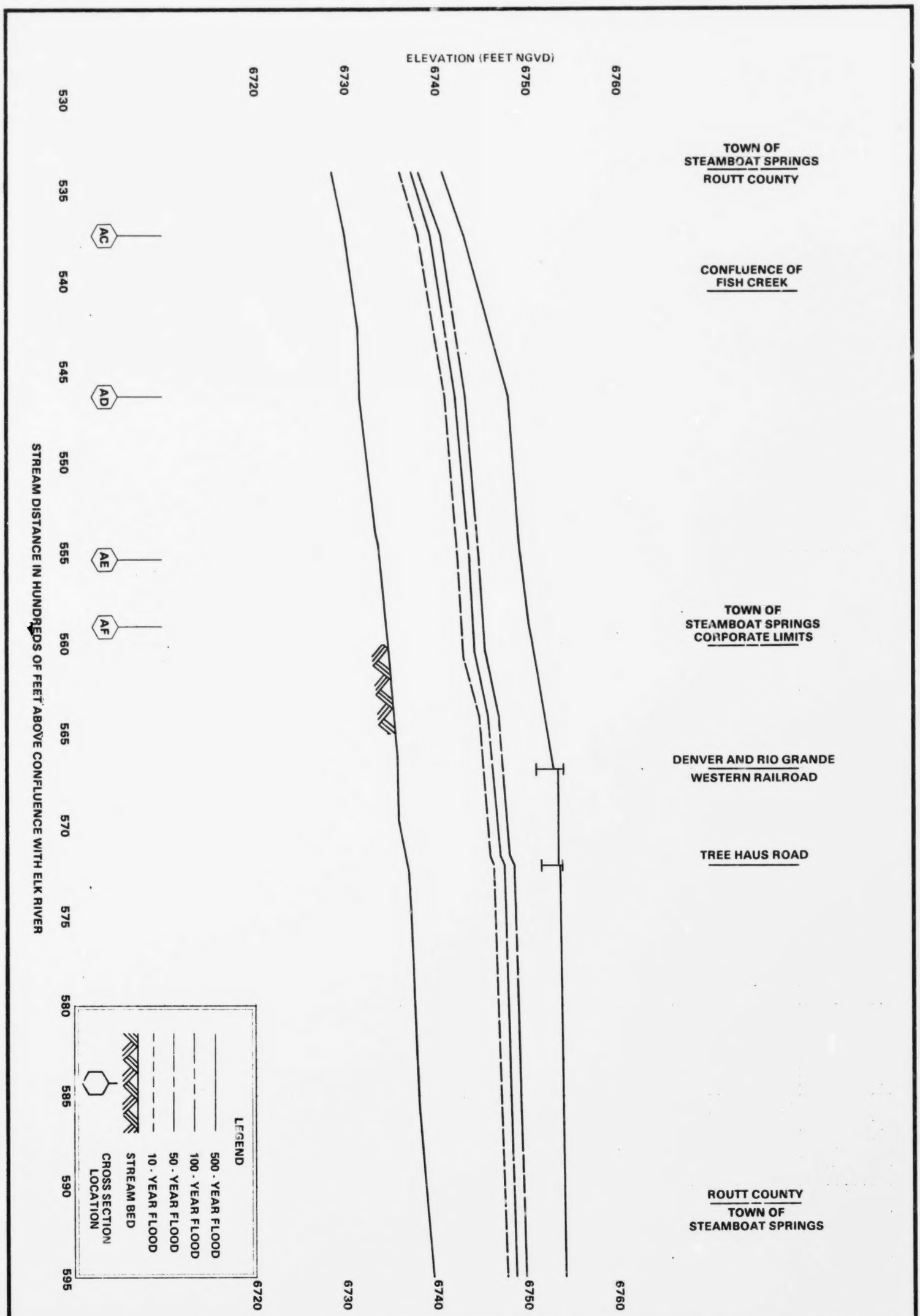
04P

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

FLOOD PROFILES

YAMPA RIVER



05P

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

FLOOD PROFILES

YAMPA RIVER

FLOOD PROFILES

YAMPA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

06P

TOWN OF STEAMBOAT SPRINGS
ROUTT COUNTY

ROUTT COUNTY
TOWN OF STEAMBOAT SPRINGS
TOWN OF STEAMBOAT SPRINGS
CORPORATE LIMITS
LIMIT OF 10-, 50-, 500 - YEAR FLOOD

DENVER AND RIO GRANDE WESTERN RAILROAD

ELEVATION (FEET NGVD)

6780
6770
6760
6750
6740

AK AL AM AN AO AP

660 665 670 675 680 685 690 695 700 705 710 715 720 725

STREAM DISTANCE IN HUNDREDS OF FEET ABOVE CONFLUENCE WITH ELK RIVER

LEGEND
500 - YEAR FLOOD
100 - YEAR FLOOD
50 - YEAR FLOOD
10 - YEAR FLOOD
STREAM BED
CROSS SECTION LOCATION

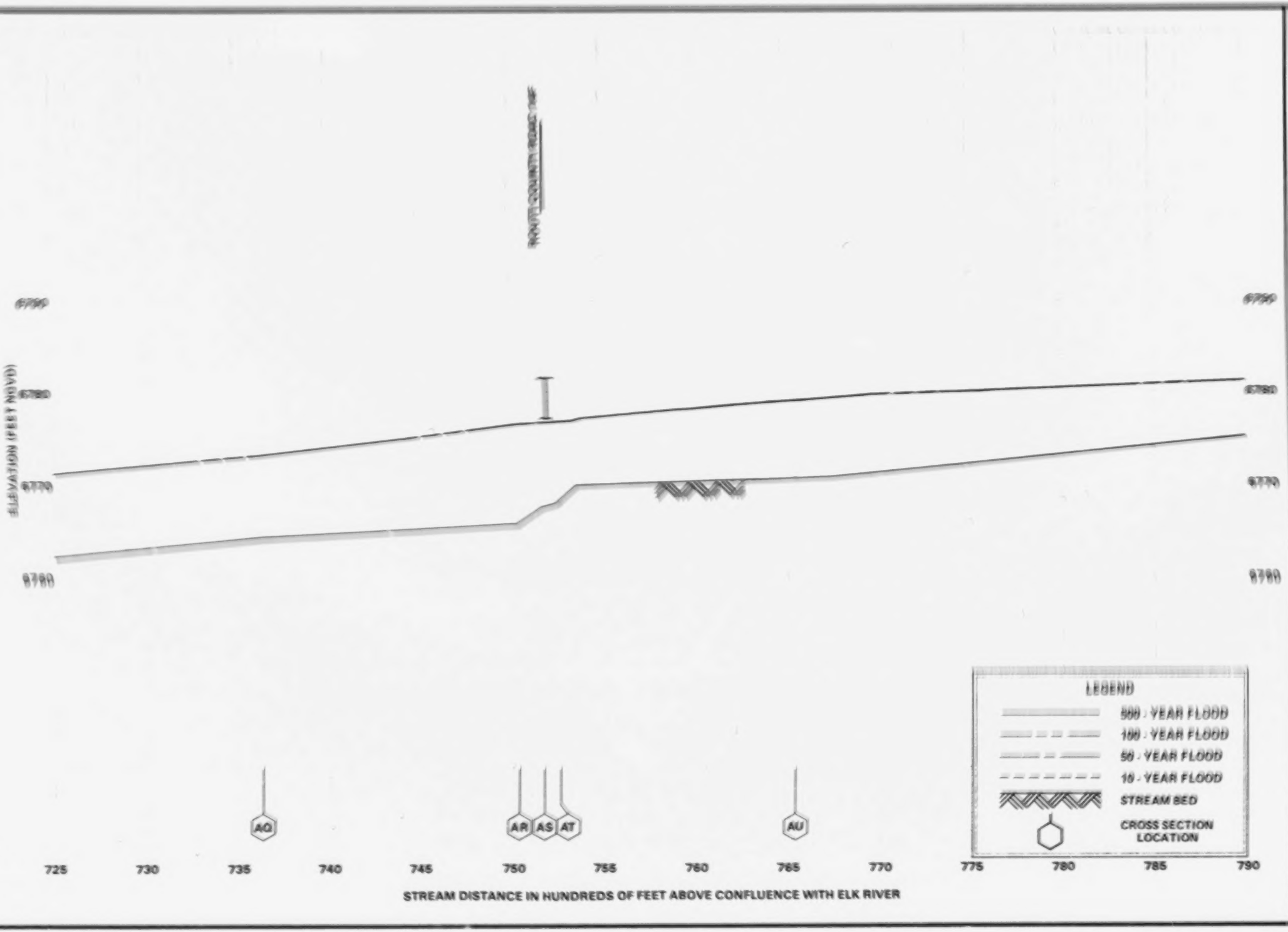
FLOOD PROFILES

YAMPA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

07P



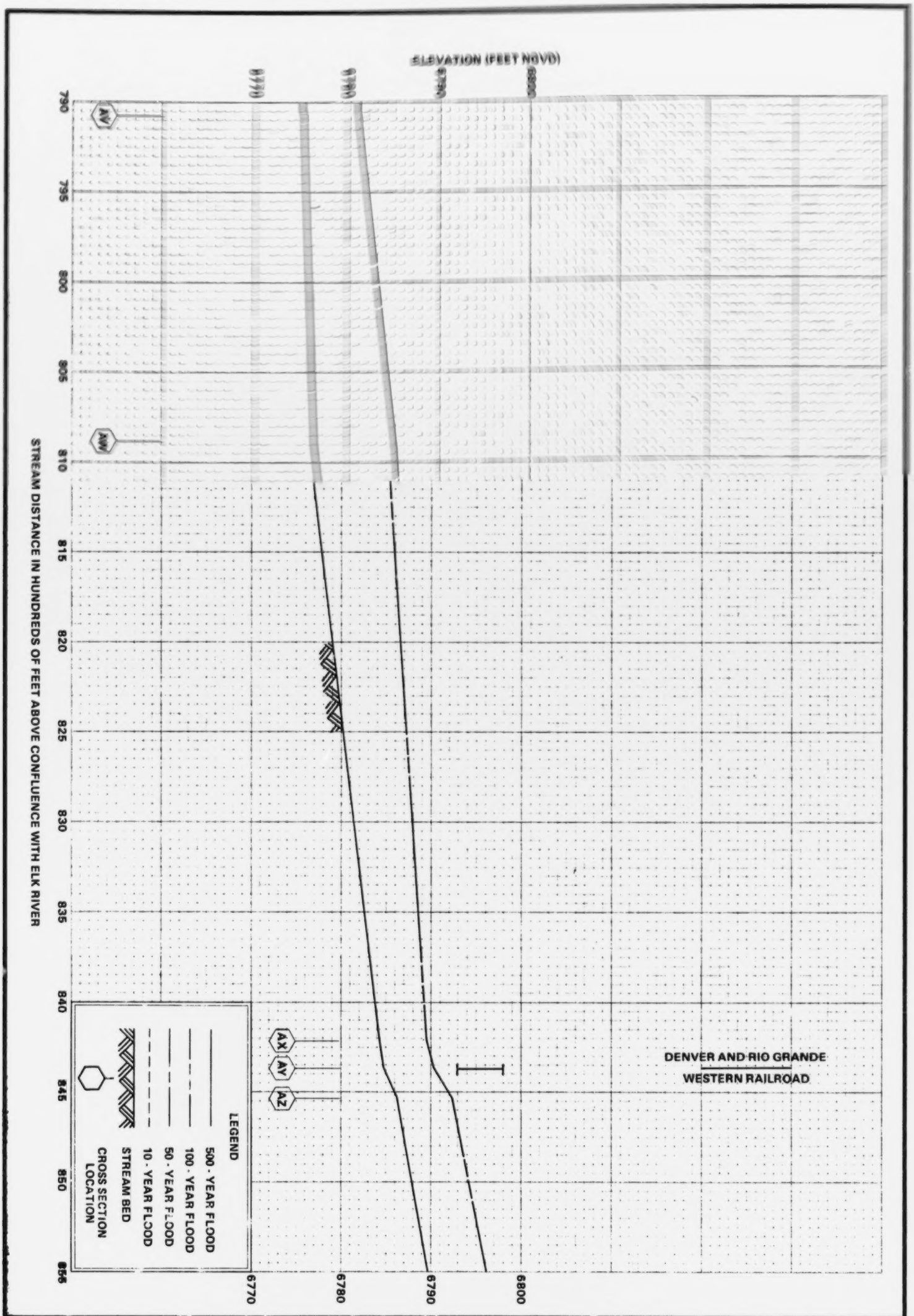
FLOOD PROFILES

YAMPA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

08P



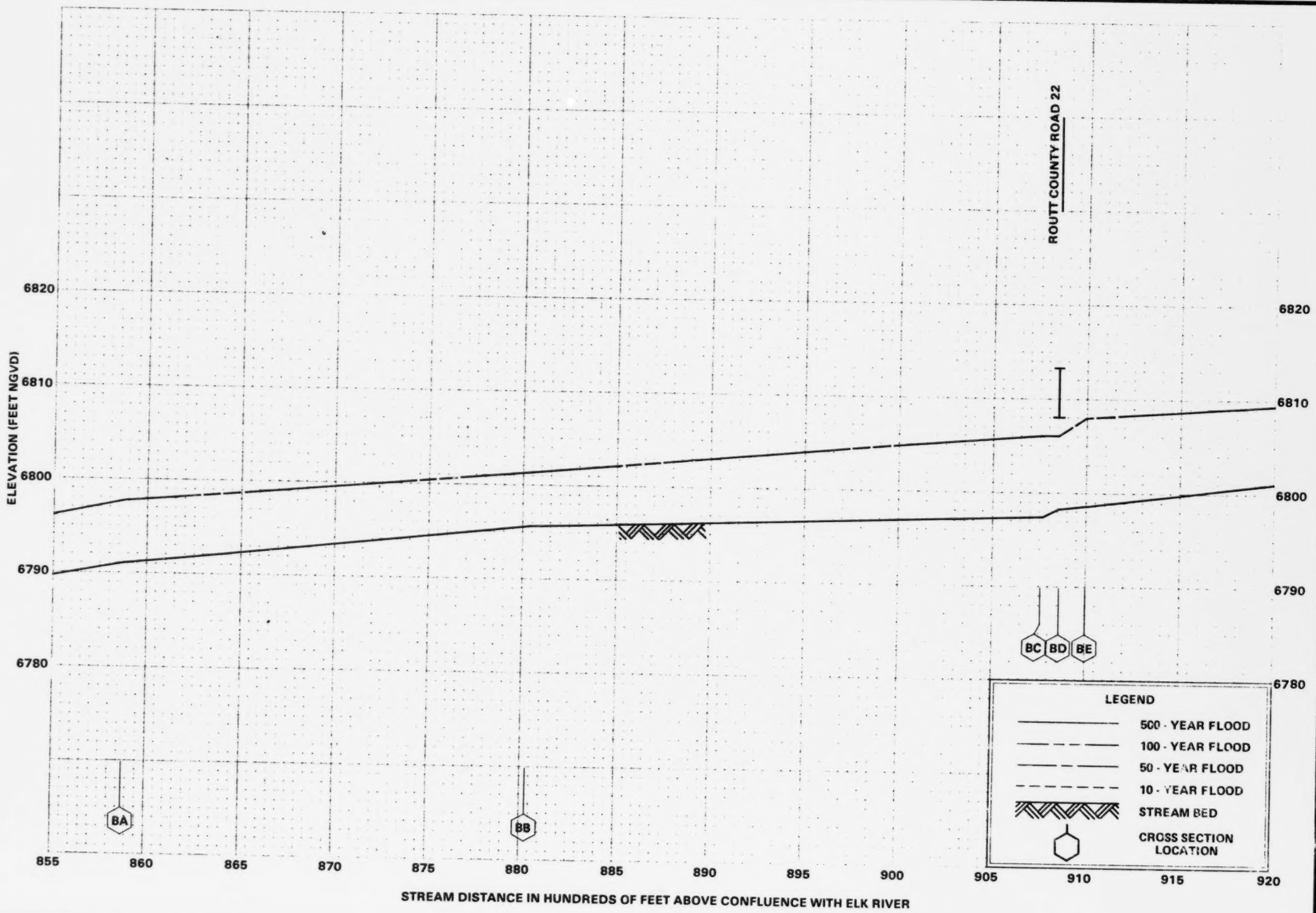
09P

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

FLOOD PROFILES

YAMPA RIVER



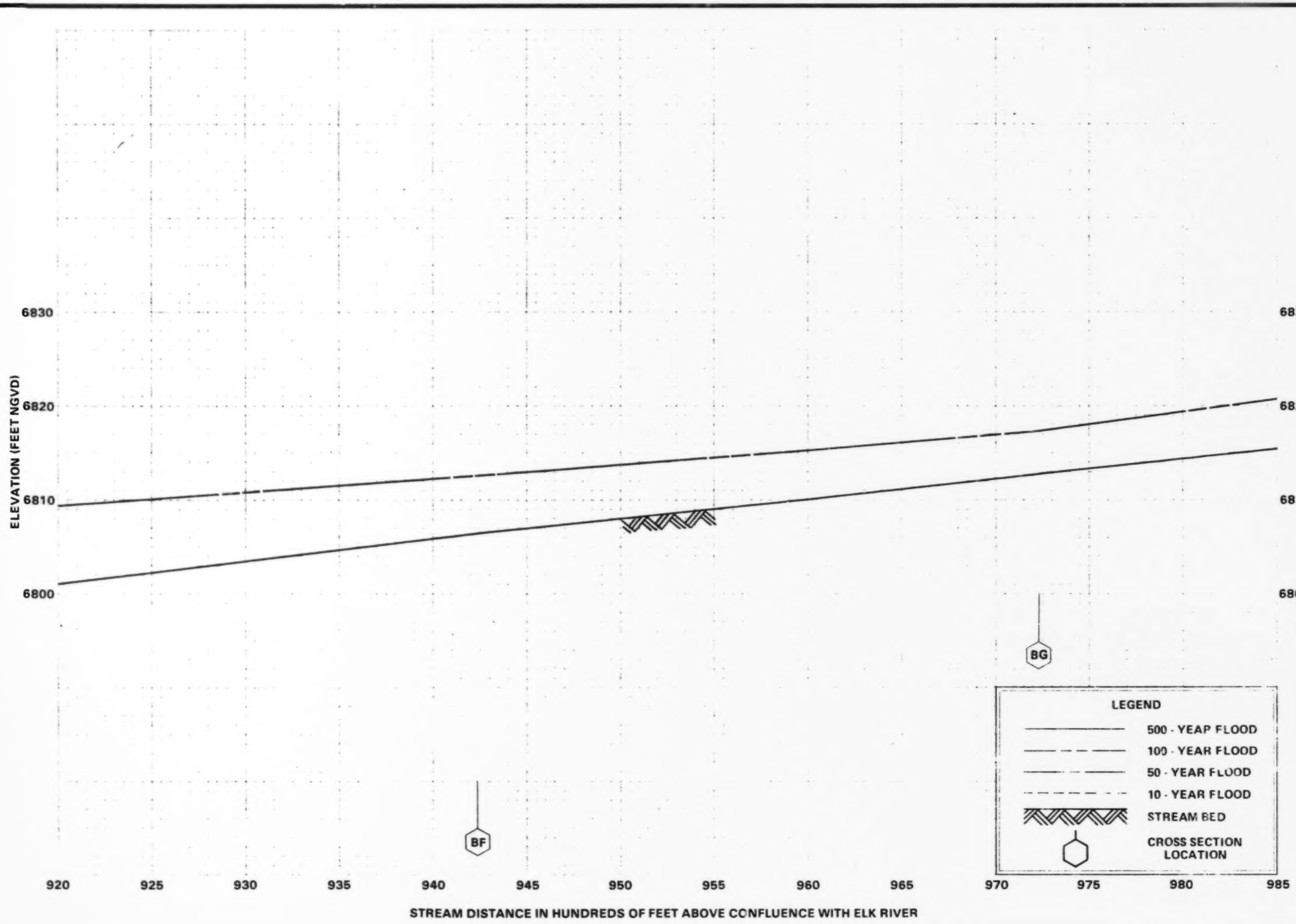
FLOOD PROFILES

YAMPA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

10P



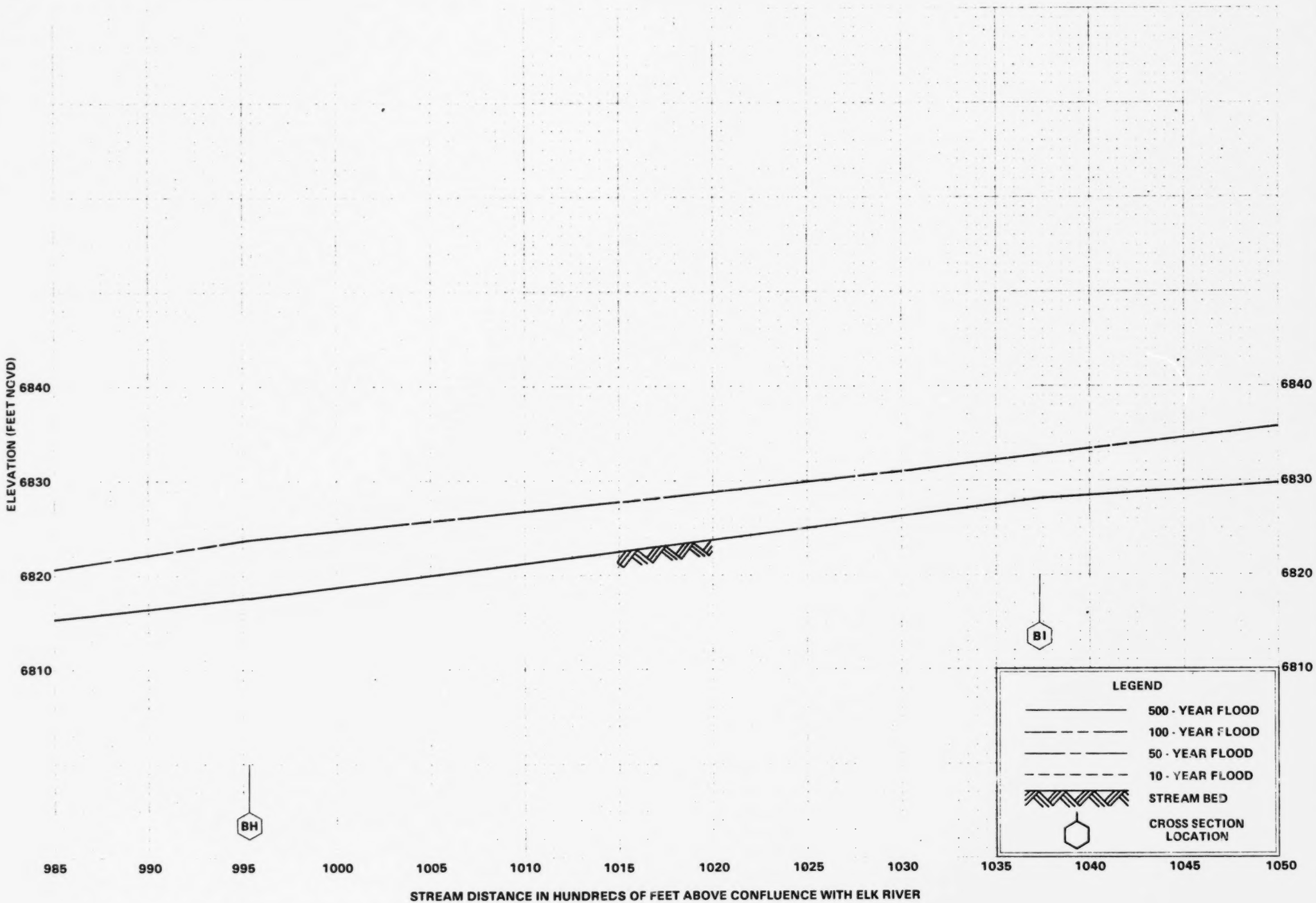
FLOOD PROFILES

YAMPA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

11P



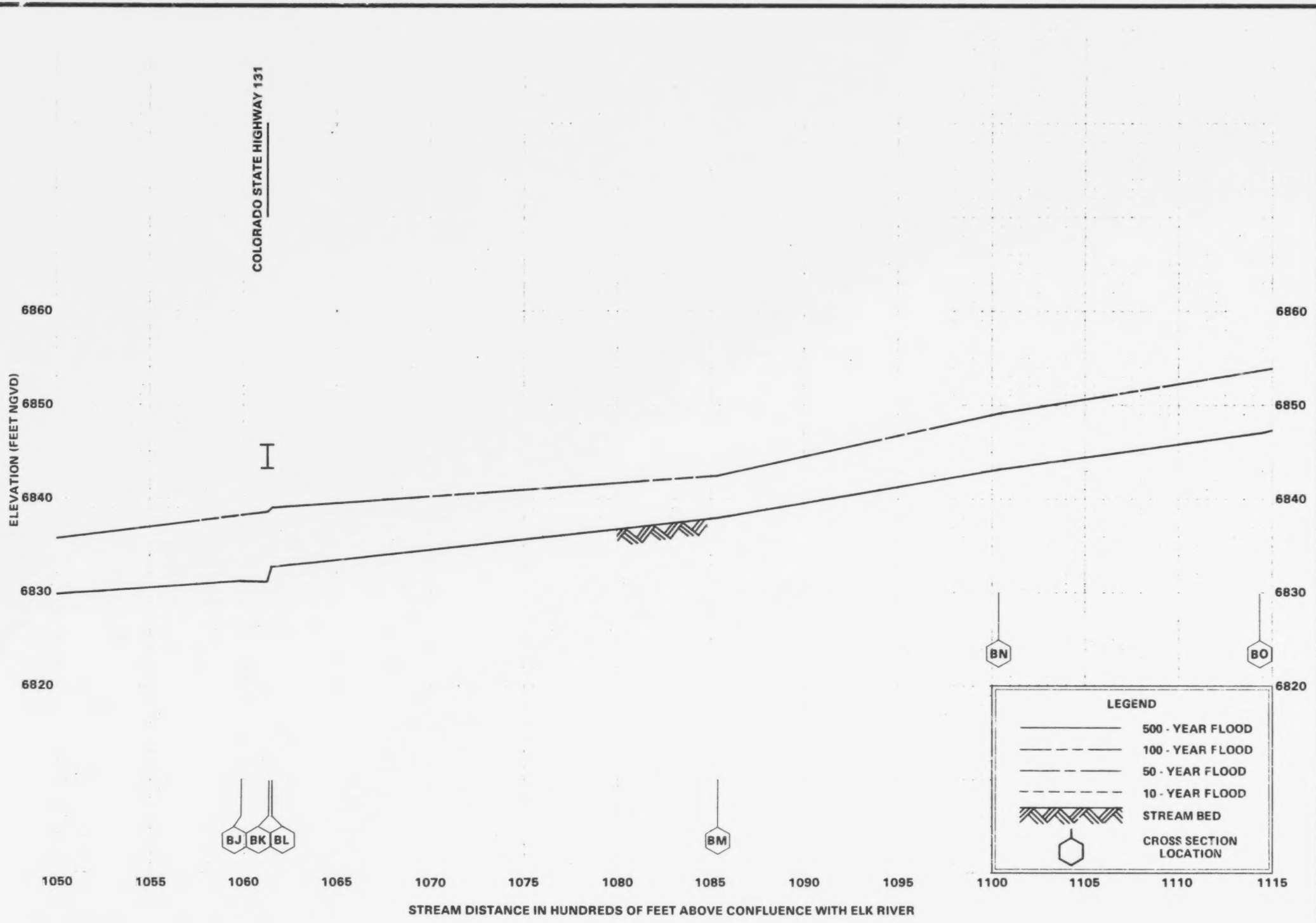
FLOOD PROFILES

YAMPA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

12P



FLOOD PROFILES

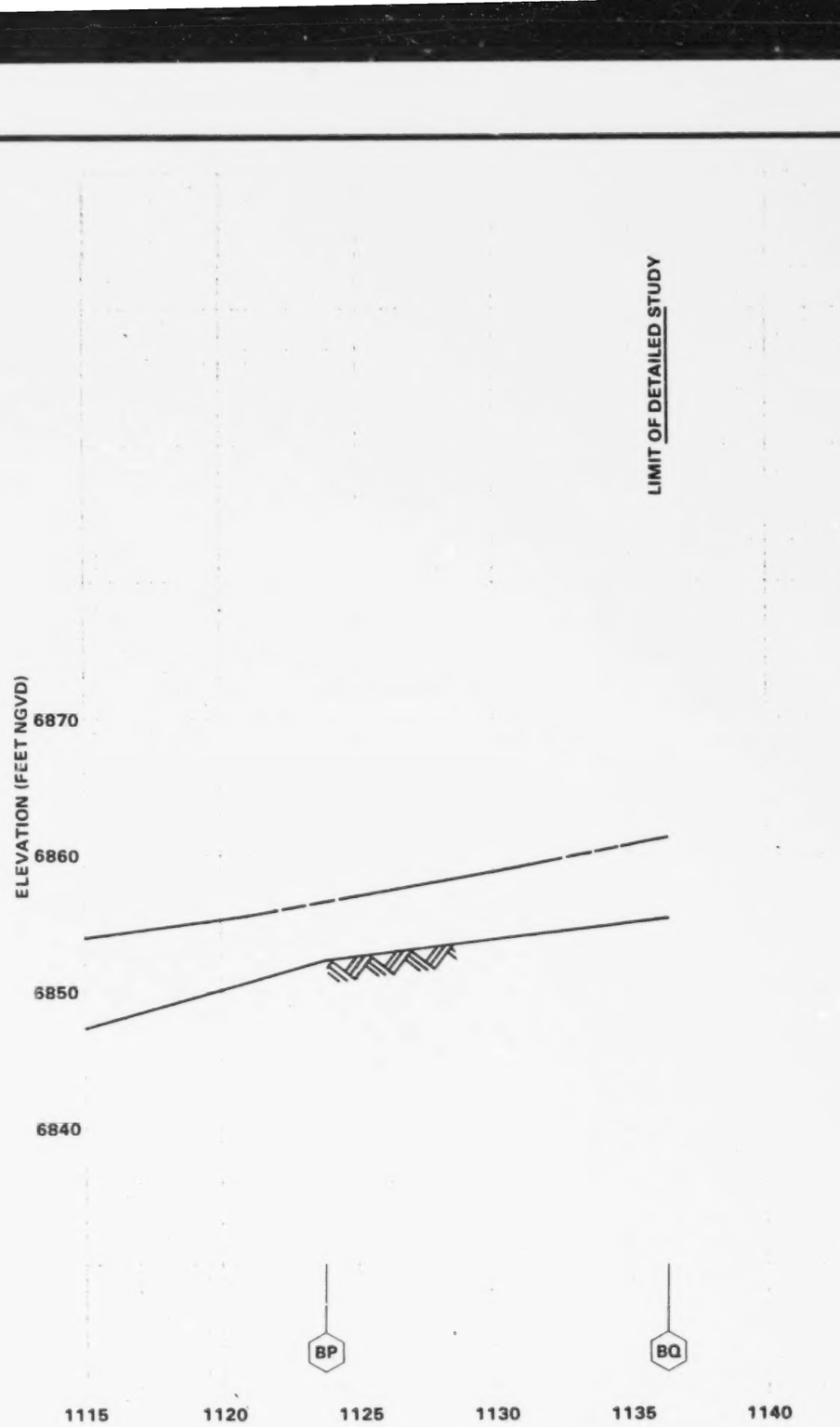
YAMPA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

13P

LIMIT OF DETAILED STUDY



LEGEND

- 500 - YEAR FLOOD
- 100 - YEAR FLOOD
- 50 - YEAR FLOOD
- 10 - YEAR FLOOD
- STREAM BED
- CROSS SECTION LOCATION

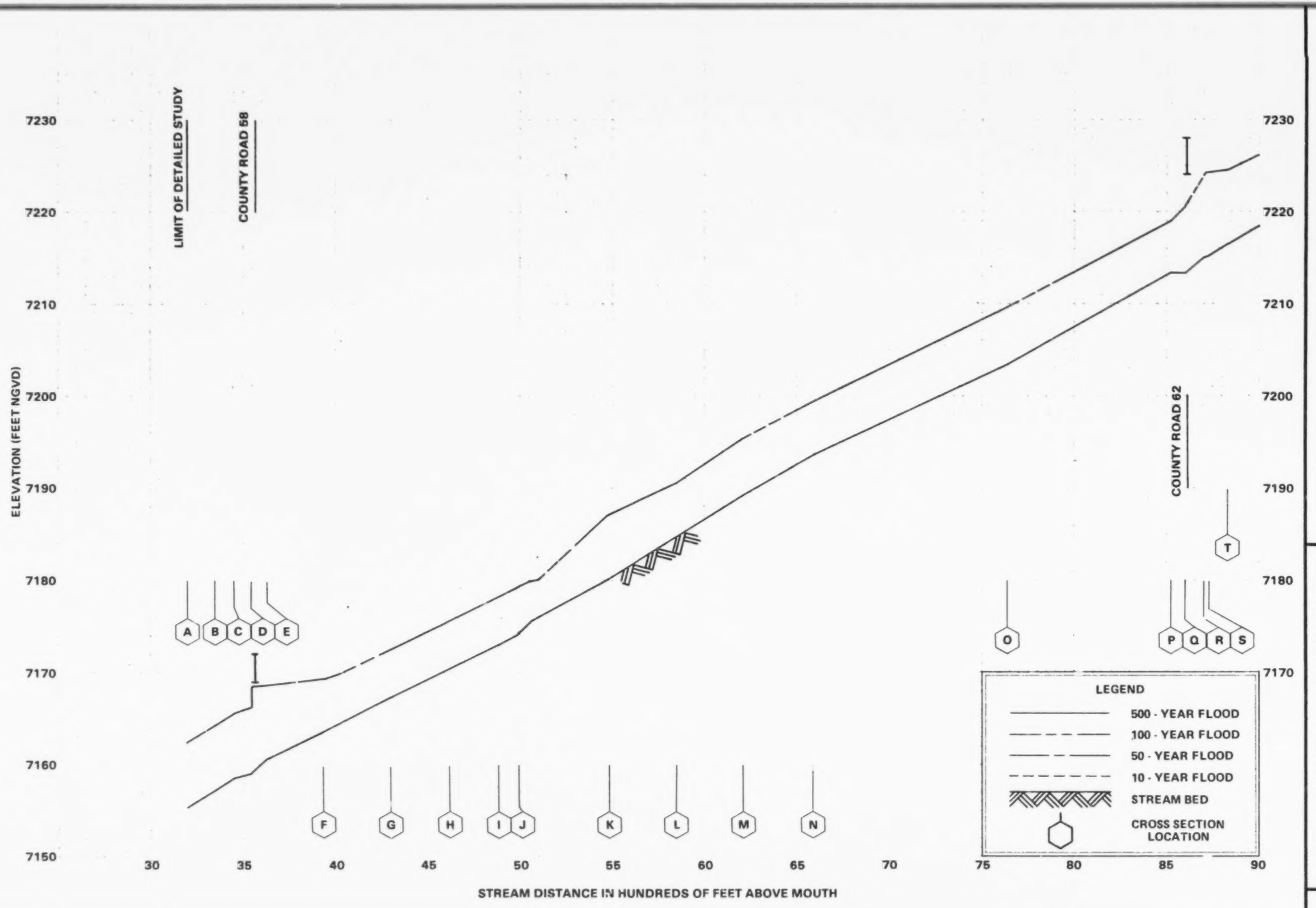
FLOOD PROFILES

YAMPA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

14P



FLOOD PROFILES

ELK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

15P

FLOOD PROFILES

ELK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

ROUTT COUNTY, CO.
(UNINCORPORATED AREAS)

16P

EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	Elevation (feet NGVD)	Description of Location
RM 1	7,279.19	A bolt head in top of a concrete post, 15 feet south of a USGS gaging station and 3.5 feet east of southeast corner of old log cabin on left bank of Elk River at Routt County Highway 129 crossing at Glen Eden.
RM 2	7,271.55	A brass cap on a 1.5-inch-diameter pipe stamped "U.S. General Land Office 1928 T.9 N.R. 85 W.," located approximately 40 feet northwest of northwest corner of fire station at west side of Routt County Highway 129, approximately 0.32 mile north of Greenville Road intersection at Clark.
RM 3	7,229.61	The east side apex of a 0.8-foot-diameter metal wingwall piling at the far southeast end of the east downstream wingwall of the Elk River crossing of Routt County Highway 62, 0.7 mile south along Routt County Highway 129 from Glen Eden and 0.35 mile west on Routt County Highway 62.
RM 4	7,168.61	Parallel hacksaw marks on a metal plate at the end of bridge headwall 3 feet downstream from bridge deck at east downstream end of Routt County Highway 58 bridge crossing of Elk River approximately 1.5 miles south along Routt County Highway 129 from Glen Eden and 0.3 mile west on Routt County Road 58.
RM 5	7,177.55	A standard disk, stamped "J132 1934," set in the top of a concrete post located 1.4 miles south along State Highway 129 from Greenville Road intersection at Clark, at the foot of a prominent hill east of the highway, at the exact top of a summit, on the outside of a curve, 65 feet northwest of the center of the junction of a trail, and 35 feet west of the centerline of the highway.

EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	Elevation (feet NGVD)	Description of Location
RM 6	6,563.59	A standard disk, stamped "J 26 1933" and set in the top of a concrete post approximately 5.7 miles west along the Denver & Rio Grande Western Railway (D&RGWRR) from the station at Steamboat Springs. From the intersection of 12th Street and Lincoln Street (U.S. Highway 40) at the western edge of Steamboat Springs, it is located approximately 5.7 miles west on U.S. Highway 40 to the intersection of a farm road crossing. From the center of the farm road and railroad intersection, disk is 40 feet south of the south rail, 20 feet east of the centerline of the road, and 5 feet north of the right-of-way fence.
RM 7	6,591.43	The top of a 0.75-inch treaded bolt set in concrete foundation base of the southwest corner of a D&RGWRR signal block numbered "1950," located immediately to the west of shed "H.B.P. 195.1," which is approximately 200 feet east and 100 feet south of Riverbend Restaurant. Riverbend Restaurant is approximately 4.8 miles west along U.S. Highway 40 from the intersection of 12th Street and Lincoln Street (U.S. Highway 40) at the western edge of Steamboat Springs.
RM 8	6,595.81	A metal spike head driven flush into the top of the westernmost fence post of three which make up the corner endpost unit at the south railway right-of-way near the southwestern end of the D&RGWRR bridge crossing of the Yampa River. Location is approximately 3.6 miles west along D&RGWRR from the station at Steamboat Springs, or approximately 4.8 miles west along U.S. Highway 40 from the intersection of 12th Street and Lincoln Street (U.S. Highway 40) at the western edge of Steamboat Springs to Riverbed Restaurant and 0.6 miles east along D&RGWRR.

EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	Elevation (feet NGVD)	Description of Location
RM 9	6,614.45	A standard disk, stamped "K28 1933" and set in the top of a concrete post approximately 2.4 miles west along the D&RGWRR from the station at Steamboat Springs. Location is approximately 2.0 miles west along Routt County Road 33 from the intersection at U.S. Highway 40, then approximately 0.5 mile north of a farmstead, 43 feet north of the north rail, 19 feet west from the center of the intersection of a farm road and railway crossing, and 4.5 feet south of the railway right-of-way fence.
RM 10	6,634.65	The south side apex of a metal sewer drain manhole lid support ring set in concrete is approximately 1.7 miles northwest along the D&RGWRR from the station in Steamboat Springs, and about 60 feet north of the railway tracks. Location from the intersection of Routt County Road 33 and U.S. Highway 40 at the western edge of Steamboat Springs is approximately 1.8 miles west on County Road 33, then approximately 0.3 mile north by foot across meadow to railway.
RM 11	6,771.10	The top surface centered 2 inches back from upper end of bevel at right upstream toe of concrete wingwall located at Yampa River bridge crossing D&RGWRR approximately 3.6 miles south along railway from station at Steamboat Springs. Location from the intersection of 5th Street and Routt County Road 14 in Steamboat Springs is 3.1 miles south on Routt County Road 14, then 0.1 mile east across pasture by foot.

EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	Elevation (feet NGVD)	Description of Location
RM 12	6,782.61	Bolt head of first bolt above bend of metal cap plate on far north end of right downstream bridge truss at Yampa River crossing of Routt County Road 14F. Location is 0.6 miles west of intersection of State Highway 131 and Routt County Road 14F or approximately 4.5 miles south of intersection of Lincoln Street (U.S. Highway 40) and 3rd Street in Streamboat Springs along routes U.S. Highway 40, State Highway 131 and Routt County Road 14F.
RM 13	6,796.43	The northwest corner apex of vertical steel rail pile driven into west railway embankment near right downstream wingwall of D&RGWRR crossing of Yampa River approximately 5.8 miles south along railway from station at Steamboat Springs. Location from the intersection of Lincoln Street (U.S. Highway 40) and 3rd Street in Steamboat Springs is 5.8 miles south via U.S. Highway 40 and State Highway 131 to private drive of Michael Holloran, 0.5 mile west to residence, then 0.25 mile north along Yampa River by foot.
RM 14	6,810.44	A standard disk, stamped "Q28 1933" and set in the top of a concrete post near ground level located approximately 6.8 miles south along the D&RGWRR from the station at Steamboat Springs. Location from the intersection of 3rd Street and Lincoln Street (U.S. Highway 40) in Steamboat Springs is approximately 7.3 miles south via U.S. Highway 40, Colorado State Highway 131, and Routt County Road 22. From the center of the crossing of Routt County Road 22 and the railroad tracks, Q28 is located 37 feet north, 37 feet west of western rail, and 10 feet east of the railway right-of-way fence.

EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	Elevation (feet NGVD)	Description of Location
RM 15	6,812.90	A 1-inch chiseled square in concrete in top of east headwall adjacent to the east upstream wingwall of Yampa River bridge at Routt County Road 22 crossing. Location is approximately 6.7 miles south from the intersection of Lincoln Street (U.S. Highway 40) and 3rd Street in Steamboat Springs, via U.S. Highway 40, Colorado State Highway 131, and Routt County Road 22 as described in RM 14.
RM 16	6,817.30	The apex of the southwest corner of concrete wingwall of Oak Creek bridge at ranch road crossing approximately 0.35 mile south of intersection of Routt County Roads 14 and 22 and approximately 0.20 mile east by foot across meadow and D&RGWRR. Location of intersection of Routt County Roads 14 and 22 is 6.5 miles south from the intersection of 3rd Street and Lincoln Street (U.S. Highway 40) at Steamboat Springs along U.S. Highway 40 and Colorado State Highway 131, then west 1.05 miles on Routt County Road 22.
RM 17	6,815.66	A chiseled cross in concrete in right upstream abutment of old bridge remnant which is approximately 6 feet upstream from newer bridge and several feet lower in elevation. Location is approximately 3.0 miles south from intersection of Colorado State Highway 131 and U.S. Highway 40 or approximately 6.9 miles south from intersection of Lincoln Street (U.S. Highway 40) and 3rd Street in Steamboat Springs along routes U.S. Highway 40 and Colorado State Highway 131.
RM 18	6,824.71	The concrete apex of the southwestern inside corner of wingwall end on Baxter Irrigation headgate structure. Location is in hay meadow 0.35 mile west and 0.05 mile north of intersection of Colorado State Highway 131 with Routt County Road 20, which if 7.5 miles south of Intersection of Lincoln Street (U.S. Highway 40) and 3rd Street in Steamboat Springs.

EXHIBIT 3 - ELEVATION REFERENCE MARKS

Reference Mark	Elevation (feet NGVD)	Description of Location
RM 19	6,846.15	A brass tab, established by Colorado State Highway Department and set in concrete in right downstream bridge curbing 12 feet from north end of bridge, located at the Yampa River crossing on State Highway 131. Location is 4.2 miles south of intersection of U.S. Highway 40 and Colorado State Highway 131 or approximately 8.1 miles south of the intersection of Lincoln Street (U.S. Highway 40) and 3rd Street in Steamboat Springs.
RM 20	6,841.71	Top of northwest corner of concrete foundation footing of newest and southernmost of Norton Jacobs' outlay of ranch buildings. Jacobs' residence is located 8.4 miles south of the intersection of Lincoln Street (U.S. Highway 40) and 3rd Street in Steamboat Springs via the following routes: U.S. Highway 40 south to State Highway 131 (3.9 miles), State Highway 131 south to Routt County Road 20 (3.5 miles) Routt County Road 20 west to private road (0.5 mile), private road 0.5 miles south.
RM 21	6,846.90	"P.K." stamped nail head set in 0.4-foot diameter wooden fence post in ditch at outside turn of Routt County Road 18. Location is 0.35 mile south of the southern end of Yampa River bridge on Colorado State Highway 131, which is about 8.1 miles south of the intersection of Lincoln Street (U.S. Highway 40) and 3rd Street in Steamboat Springs via U.S. Highway 40 and State Highway 131.
RM 22	6,857.15	Top of metal cap on metal post set by Dismuke & Dismuke, Inc. Engineers, marking intersection corner of Sections 21, 22, 27, 28, Routt County T5N, R84W. Section marker is in hay meadow, flagged by taller metal fence post. Access by foot across valley floor.